To All Members, Date: 11 January 2009

CANDIDATES APPROVED TO SIT FOR PROFESSIONAL INTERVIEW FOR YEAR 2010

In accordance with Bylaws 3.9, the undermentioned names are published as having applied for membership of the Institution, subject to passing the year 2010 Professional Interview.

If any Corporate Member of the Institution has any reason as to why any of the candidates is not a fit and proper person for election, he should communicate in writing to the Honorary Secretary. Such communication bearing the name and the membership number of the complainant should be lodged ***a month*** from the date of publication.

Thank you.

Ir. Assoc. Prof. Dr Jeffrey Chiang Choong Luin
Honorary Secretary,
The Institution of Engineers, Malaysia

NEW APPLICANTS

Name	Qualifications
CHEMICAL ENGINEERING	
NOR ZELAN BIN JALIL	BE HONS (UTM) (CHEMICAL, 88)
CIVIL ENGINEERING	
AMIN BIN ALIAS	BE HONS (MALAYA) (CIVIL, 01)
ANUAR BIN ABDULLAH	BE HONS (UiTM) (CIVIL, 93)
CHIENG SIEW HUI	BE HONS (USM) (CIVIL, 97)
FAKHRURAZI BIN ISMAIL	ADV DIP (UiTM) (CIVIL, 94)
HAMIDAH BIN RAMALEY	BE HONS (MALAYA) (CIVIL, 00)
HII CHAN SENG	BE (McGILL UNI) (CIVIL, 1979)
MOHAMED TALMIZI BIN MOHD YUSOFF	BSc HONS (UNI OF ABERDEEN) (CIVIL, 87)
MOHAMMAD ARFIAN BIN ABDUL RASHID	BE HONS (UNIMAS) (CIVIL, 03)
NORHISYAM BIN MAT YUSUF	BE HONS (UiTM) (CIVIL, 00)
ONG CHET YUN	BE HONS (UTM) (CIVIL, 01)
TEONG CHING ET	BE HONS (UMS) (CIVIL, 02)
ZAIZUL IMRAN BIN ZAINAL	BE HONS (UKM) (CIVIL & STRUCTURE, 98)
ELECTRICAL ENGINEERING	
AZUHAR BIN ISMAIL	BE HONS (UTM) (ELECT, 85)
MOHAMAD FAZDHLI BIN HASSAN	BSc (LAMAR UNI, BEAUMONT, TEXAS) (ELECT, 91)
MOHAMAD SUPIAN BIN SELAMAT	BE HONS (UTM) (ELECT, 00)

NEW APPLICANTS

Name	Qualifications
MOHD FARIZ BIN RAMLI	BSc (MISSOURI) (ELECT, 95)
SIOW PING CHONG	BE HONS (NOTTINGHAM TRENT) (ELECT & E'TRONIC, 94)
ELECTRONIC ENGINEERING	
AHMAD ZAWAWI BIN KASMIN	BE HONS (UKM) (ELECT, E'TRONIC & SYSTEM, 00)
MOHD IQBAL BIN RIDWAN	BE (KEIO UNI) (ELECT & E'TRONIC, 05)
INSTRUMENTATION AND CONTROL ENGINEERING	
MOHD MARZUKI BIN MUSTAFA	BE HONS (TASMANIA) (ELECT, 85)
MECHANICAL ENGINEERING	
FADZLI BIN BURHANUDDIN	BE HONS (UNITEN) (MECH, 03)
KAMARULZAMAN BIN KAMIS	BE HONS (CASE INST OF TECH, WESTERN RESERVE UNI) (MECH, 91)
LEONG SEAK WAI	BSc (SOUTH ALABAMA) (MECH, 01)
MOHD NAIMIE BIN MAZID	BE HONS (UTM) (MECH, 02)
RAMLAN BIN SIAHAT	BE (GANNON UNI PENNSYLVANIA, USA) (MECH, 88)
ROSHISHAM BIN ISMAIL	BSc (HARTFORD, USA) (MECH, 91)
TAN KHIM BOK	BE HONS (MALAYA) (MECH, 01)
ZAINUL ASRI BIN MAMAT	BE HONS (IMPERIAL COLLEGE OF SC, TECH & MED, UNI OF LONDON) (MECH, 92)

TRANSFER APPLICANTS

M'ship No	Name	Qualifications
CIVIL ENGINEERING		
35606	AHMAD SYAFAWY BIN MOHD SAMURI	BE HONS (UTM) (CIVIL, 02)
36963	AZHAILI BIN BAHARUN, DR	BSc (HARTFORD) (CIVIL, 90)
16592	CHANG AIK HOOI	BE HONS (SHEFFIELD) (CIVIL-STRUCTURE, 94)
28036	CHOONG KEAN WUI	BE HONS (MALAYA) (CIVIL, 05)
25162	LAI WOON FATT	BE HONS (UTM) (CIVIL, 05)
26425	LOW TING KANG	BE HONS (MALAYA) (CIVIL, 04)
29203	MOHD AMIN BIN IRAM	BE HONS (UTM) (CIVIL, 01)
32669	MOHD HARYAZI BIN ABDULLAH	BE HONS (UTM) (CIVIL, 05)
24413	MOHD THARMIZI BIN MOHD YUSOF	BE HONS (UTM) (CIVIL, 01)
28788	NGO BOON PING	BE HONS (UKM) (CIVIL & STRUCTURE, 02)
28032	SALLEH BIN MOHAMAD HANAPIAH	BE HONS (USM) (CIVIL, 01)
27538	WENNDY BIN SEBLI	BE HONS (UNIMAS) (CIVIL, 01)
ELECTRICAL ENGINEERING		
34190	AHMAD FARID BIN JAMIL	BE HONS (UTM) (ELECT, 05)
18099	GOBBI S/O RAMASAMY	BE HONS (UTM) (ELECT, 98)
28795	HO WUI SING	BE HONS (MALAYA) (ELECT, 06)

TRANSFER APPLICANTS

M'ship No	Name	Qualifications
12649	JUMALI BIN BASIR	BE (MONASH UNI) (ELECT, 88)
25367	MOHD AZLAN BIN OTHMAN	BE HONS (UiTM) (ELECT, 06)
39213	MOHD FAZLIZULLAIL BIN AHMAD RAMLI	BE HONS (UTM) (ELECT, 02)
ELECTRONIC ENGINEERING		
22940	NG WOOI CHOON	BE HONS (LINCOLN) (ELECTRONIC, 01)
MECHANICAL ENGINEERING		
29236	AZIRAM BIN MAT SALLEH	BE HONS (UiTM) (MECH, 00)
16801	BOEY WEI LUN	BE HONS (UTM) (MECH-AERONAUTICS, 89)
36311	ISMAIL BIN KHALID	BE HONS (UNIMAS) (MECH & MANUFACTURING SYSTEM, 00)
27571	NEO HAI FUN, RONNIE	BE HONS (MMU) (MECH, 06)
27636	PUKALENTHI A/L SUBRAMANIAM	BE HONS (UTM) (MECH, 04)
19092	THANARAJ A/L THAVAMANI	BE HONS (UPM) (MECH. SYSTEM, 97)
19296	TAN CHEE KOAN	BE HONS (UTM) (PETROLEUM, 96)

LATEST UPDATE!

CONTRIBUTION TO WISMA IEM BUILDING FUND

RM1,270,225.20 from IEM Members

RM340,502.00 from Private Organisations

TOTAL

RM1,610,727.20

(ANOTHER RM10,539,272.80 IS NEEDED)

IEM wishes to take this opportunity to thank all members who have contributed and would like to appeal for support from members who have not yet contributed

HELP US TO PROVIDE BETTER SERVICES TO YOU AND TO THE FUTURE GENERATION

DONATION LIST TO THE WISMA IEM BUILDING FUND

23rd Announcement

The Institution would like to thank all contributors for donating towards the Wisma IEM Building Fund. Members and readers who wish to donate can do so by downloading the form from the IEM website at http://www.iem.org.my or contact the IEM Secretariat at +603-79684001/2 for more information. The list of the contributors as at 31 December 2009 are shown as below.

NO.	MEMBERSHIP NO.	DETAILS
1	M02820	TAN LEK LEK
2	-	CT Consultants Sdn Bhd

IEM DIARY OF EVENTS

For further enquiries on the events below, please visit IEM Homepage at http://www.iem.org.my or contact IEM Secretariat for further information and forms.

Geotechnical Engineering Technical Division
2 & 3 MARCH 2010
2-Day Course on Determination of Soil Parameters using Laboratory and In-Situ Tests
Venue: Prof. Chin Fung Kee Auditorium, Wisma IEM, Petaling Jaya
Time: 8.30 a.m. to 5.00 p.m.
Fees: AGSSEA/IEM/ICE Member – RM600
Non Member – RM800
(Invitation to register)

MAJOR EVENTS
Tunnelling and Underground Space Technical Division
1-3 MARCH 2011
INTERNATIONAL CONFERENCE AND EXHIBITION ON TUNELLING AND TRENCHLESS TECHNOLOGY
Venue: Sheraton Subang Hotel and Towers
Tel: 603 7968 4001/2 Fax: 603 7957 7678
E-mail: Tunnel2011@iem.org.my
Website: http://www.iem.org.my
(2nd Announcement: Call for paper and registration)

3 APRIL 2010
BALLOT PAPER OPENING DAY
Time: 9.00 a.m to 5.00 p.m
(IEM closed for this day)

17 APRIL 2010
51ST IEM AGM
Venue: Wisma IEM
Time: 9.00 a.m to 2.00 p.m

51ST IEM ANNUAL DINNER
Venue: 1st Floor, Ballroom 1, 2 3, Sime Darby Convention Center, Bukit Kiara, KL
Time: 7.00 p.m to 12.00 p.m

CONFERENCES & SEMINARS

MALAYSIA
10-13 MAY 2010
10TH INTERNATIONAL CONFERENCE ON INFORMATION SCIENCES, SIGNAL PROCESSING AND APPLICATION
Venue: Renaissance Hotel, KL
Tel: +607 521 8170/8159
E-mail: isspa2010@spaceutm.edu.my
Website: www.spaceutm.edu.my
(Call for Papers and Invitation to Register)

15-17 JUNE 2010
INTERNATIONAL CONFERENCE ON SUSTAINABLE BUILDING AND INFRASTRUCTURE 2010 (ICSBI 2010): TOWARDS SUSTAINABLE FUTURES
Venue: Kuala Lumpur Convention Centre
Tel: 05-3687 352 Fax: 05-3656 716
Email: icsbi@petronas.com.my
Website: www.utp.edu.my/icsbi2010
(Invitation to register)

KOREA
20-22 OCTOBER 2010
2010 KSCE ANNUAL CONFERENCE AND CIVIL EXPOSITION
Venue: Songdo Convensia , Incheon
Tel: +82-2-3400-4506
Fax: +82-2-443-2112
Email: song@ksce.or.kr
Website: www.ksce.or.kr
(Invitation to Register)

IEM Job Vacancy Advertisement

Greetings from The Institution of Engineers, Malaysia.

It gives us great pleasure to notify you of a new value added service that IEM will be providing to our members as well as companies involved with the supply of products and services related to the engineering profession. As you may be aware, the new IEM building, Wisma IEM, is now the venue for all IEM activities such as talks, seminars, courses, workshops, *etc*.

With a nominal fee, we are offering you the opportunity to introduce your products and services to fellow engineers by putting up advertisements at our advertisement boards/panels or electronic board. Check out our offer in the IEM website, www.iem.org.my.

Feel free to contact our IEM Secretariat staff at 03-79684021 (Tarmizi) or 03-79684001 (Rozana) for further information.

Looking for Engineers?

Advertise your vacancies on one of the most prestigious engineering website in Malaysia. Hire qualified candidates!

Cheaper than using traditional search firms or newsprint!

Over 20,000 Engineers exposed to your job posting

Approximately 300 website hits per day

Job postings appear for 30 days in website compared to 1 day for newsprint

Only minimum of RM50 per job advertised for IEM members and RM100 for non-members

Please be informed that IEM provides job vacancy advertisement through the IEM Website and Notice Board to its members and non-members who are looking for engineers on a full time/contract or on part-time basis to fill job vacancies in their respective companies. The 'Job Vacancy Advertisement Form' and 'Its Terms and Conditions' are available at the IEM website, www.iem.org.my or you may contact Pn. Rozana, the IEM Secretariat at 03–7968 4001 for more details.

Job seekers can search for their desired employment in the IEM Website under the 'Job Gallery' section for the latest job vacancy advertisements.

Thank you and best regards,

Chairman
Standing Committee on Welfare and Service Matters
The Institution of Engineers, Malaysia

NEW IEM MEMBERSHIP CARD

Effective from 1 January 2008, IEM has introduced a new IEM membership card for all Members. The new card had been designed to include bar code features as provision for future expansion. It is hoped that this new card would assist IEM to provide better and more efficient service to the Members.

Members who have not collected the card can submit a "scanned" passport sized photograph (softcopy) in JPEG format and e-mail to **iemphoto@gmail.com**. Kindly indicate your name, membership number and grade upon submission.

You may also contact the IEM Secretariat at 603-79684017 for an appointment for your photo to be taken.

Thank you for your co-operation.

OUR APOLOGIES

In a feature article entitled 'Soil-Structure Interaction in Soft Soil' published in the January 2010 issue of JURUTERA, the author's position should be Committee Member of Geotechnical Engineering Technical Division instead of as published. We apologise for the error.

CALL FOR NOMINATIONS

IEM ENGINEERING HALL OF FAME AWARD 2011

The Sub Committee of the Engineering Hall of Fame under the auspices of the Standing Committee on Professional Practice is proud to invite nominations for the IEM Engineering Hall of Fame Award 2011.

It is timely and expedient to induct and to record the accomplishment of engineers in the country who had or have demonstrated particularly outstanding professional achievement and provide excellent services to the Institution, the engineering industry and the nation.

The IEM Engineering Hall of Fame was established with the aim to confer recognition and to celebrate the accomplishment of members of the IEM;

- *Who have demonstrated outstanding professional achievement.*
- *Who have made significant contribution to the engineering progress, the Institution of Engineers, Malaysia (IEM) and the nation.*
- *Who have rendered valuable service to the community.*

The Engineering Hall of Fame will serve as the focal point or showcase of outstanding Malaysian engineers, past and present, who had/have made great contribution to the engineering profession and to the quality of life in Malaysia.

It will also serve as a beacon and as role models to young engineers and to encourage a greater interest in engineering in general and also to create a greater awareness of the names of outstanding engineers in the country.

Nominations of the Award are open to Malaysian citizens who had been or are Corporate Members of the IEM.

*The closing date for the receipt of nominations for the IEM Engineering Hall of Fame Award is **30 September 2010**. Nomination forms can be downloaded from the IEM website (http://www.iem.org.my). For further details, kindly contact the IEM Secretariat at 03-7968 4001/2.*

ISM EXCELLENCE AWARD

The Institution of Surveyors Malaysia is inviting IEM to nominate nominee(s) for the ISM Excellence Award for Outstanding Contribution towards Sustainability.

This is an award made to an individual, organisation or development in recognition of their outstanding contribution towards sustainability of the environment, efficient use of natural resources and meeting the social needs of the present and future generations.

The recipient will receive a plaque and monetary award worth RM3,000.00 which will be represented at 49th Annual Dinner scheduled to be held on **19 June 2010**.

Eligibility

For Development Project(s) :

1) Entries must have demonstrated the professional skills of the individuals, organisations or consultants in contributing towards sustainability.
2) Entries must be based on project(s) or research (development or social) which the individuals, organisations or consultants have undertaken.

For individuals, organisations or consultants :

1) Entries must have demonstrated the professional skills of the individuals, organisations or consultants in contributing towards sustainability.
2) Entries must be based on project(s) or research (development or social) which the individuals, organisations or consultants have undertaken.

Closing date for submission of entries is **31 March 2010**. Entry forms are available at the IEM Secretariat. Please contact Puan Aziah at 03-7968 4001/2 for further details.

IEM LIBRARY RENOVATION

We regret to inform our members that our Library will be temporarily closed. Members will be glad to know that our library will undergo renovation and refurbishing from the month of **February to March 2010**. Hence, the library will be temporary closed for renovation from **22 February to 31 March 2010**.

Members who have borrowed our books should return them to the library before **13 February 2010**. Lending of books is temporarily suspended from **1 February 2010**. Your cooperation on this matter is highly appreciated.

This is to faciliate renovation and refurbishment works to enhance the overall ambiance in line with it being the knowledge based resource centre.

Thank you.

Ir. C M M Aboobucker
Chairman, Library Sub Committee 2009/2010

Development of a Guideline for Microbial Quality in Wastewater Discharge for Water Reuse

by **Cik Marfiah Abdul Wahid and Mr. Hiroaki Tanaka**

1.0 INTRODUCTION

In Malaysia, even though a few remedial strategies have been developed to control water pollution, it has been reported that domestic wastewater is still the key cause of river pollution contributing a total of 50% to water pollution followed by industry effluent (45.7%), animal farm (4.8%) and agro-based industry (2.6%). Domestic wastewaters include public sewage treatment plants (59%), private sewage treatment plants, sullage from households, discharge of raw sewage from squatters and discharge from primitive systems (21%), and individual septic tanks (20%) (DOE, 2005).

Malaysian river waters are overloaded with pollutants and often contain 30 to 100 times more pathogens, heavy metals and compounds from industry and agriculture than the level permitted by the Interim National Water Quality Standards (INWQS) for Malaysia (Table 1). Classes I to V are categorised by the water quality index based on nutrient, pH, biological oxygen demand (BOD) and chemical oxygen demand (COD).

A report by UNEP-GEMS showed that Klang River, which is located in Kuala Lumpur, contained the highest faecal coliform bacteria count (606,750 Coliform Forming Unit (CFU)/100mL) on an annual average in 1992. Compared to INWQS, Klang River is categorised as Class V of the faecal coliform standard. Faecal coliform bacteria count in most rivers is reflective of those that received untreated domestic wastewater.

One of the problems that should be considered is the fact that not all wastewater were collected and transferred to be treated in a wastewater treatment plant. Consequently, this contributed to heavy pollution in receiving water bodies which is also used as a water supply, for domestic usage, agricultural activities, natural, industry and recreational activities. A major concern is that some of these pathogens can have a prolonged survival rate in the environment and is resistant to the conventional treatment process in a water treatment plant. There were evidences relating to the contamination of wastewater as seen by the following incidences of the outbreak of waterborne-diseases; 2600 cases of gastroenteritis in Seremban in 1982; 81 cases of infectious hepatitis in Raub in 1987; 940 cases of infectious hepatitis in Kota Belud in 1988; 300 cases of typhoid fever in Johor Bahru in 1990 and 1278 cases of cholera mostly in Pulau Pinang in May 1996 (Pillay *et al.*, 2003).

In order to protect the public's health from pathogenic microorganisms originating from wastewater, all types of wastewater should be collected and treated in a wastewater treatment plant. However, primary and secondary treatment is insufficient to deactivate pathogenic microorganisms. Therefore, a disinfection process should be applied after the secondary treatment before releasing it back to the water environment.

Currently, there are still no guidelines or regulations related to microbial parameters and wastewater effluent standard in Malaysia. Therefore, it is necessary to formulate potential microbiological guidelines by referring to other countries. However, the guidelines are meant to be adapted to local social, economic and environment factors. Therefore, the guideline should depend on the receiving area or the usage of treated wastewater. The objective of this study is to recommend a mechanism to control pathogenic microorganisms originating from wastewater effluent in Malaysia.

2.0 GUIDELINE OF MICROBIAL QUALITY IN WASTEWATER DISCHARGES

In developing the guideline, an approach should be considered whether to quantitatively or qualitatively control the public health hazards associated with water. Furthermore, the assessment and management of the health risk associated with exposure to microbial hazards in water is facing a few challenges including the detection and enumeration technology, difference in water matrix, and inconsistent management and surveillance. The key element for developing the guideline is based on comprehensive data monitoring and surveillance system together with a reliable health risk assessment model for better prediction during an outbreak, thus creating a baseline of the guideline is recommended (Figure 1).

The microorganisms associated with water-associated illnesses (*i.e.* water-related, waterborne) include typhoid fever, cholera, shigellosis, hepatitis, jaundice fever, diarrhoea, amoebiasis and gastroenteritis. Certain types of bacteria, viruses, protozoa and helminthes, and some pathogens are more resistant than others to conventional wastewater treatment (including chlorination) during the

Table 1: Interim National Water Quality Standards (INWQS) for Malaysia

Parameters	Unit	Classes					
		I	IIA	IIB	III	IV	V
Faecal Coliform	Counts/100mL	10	100	400	5000 (20000)	5000 (20000)	-
Total Coliform	Counts/100mL	100	5000	5000	50000	50000	>50000

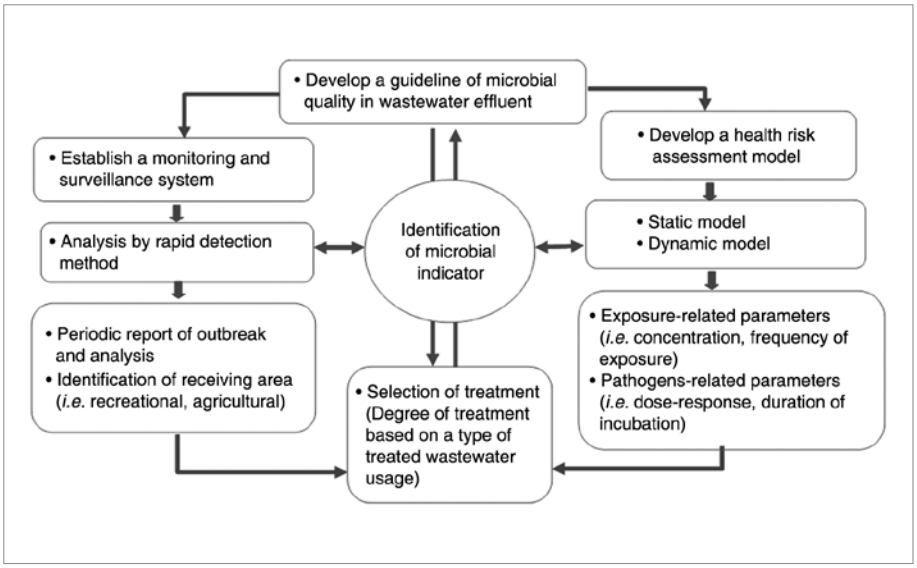

Figure 1: Recommended method to control pathogenic microorganisms from wastewater effluent

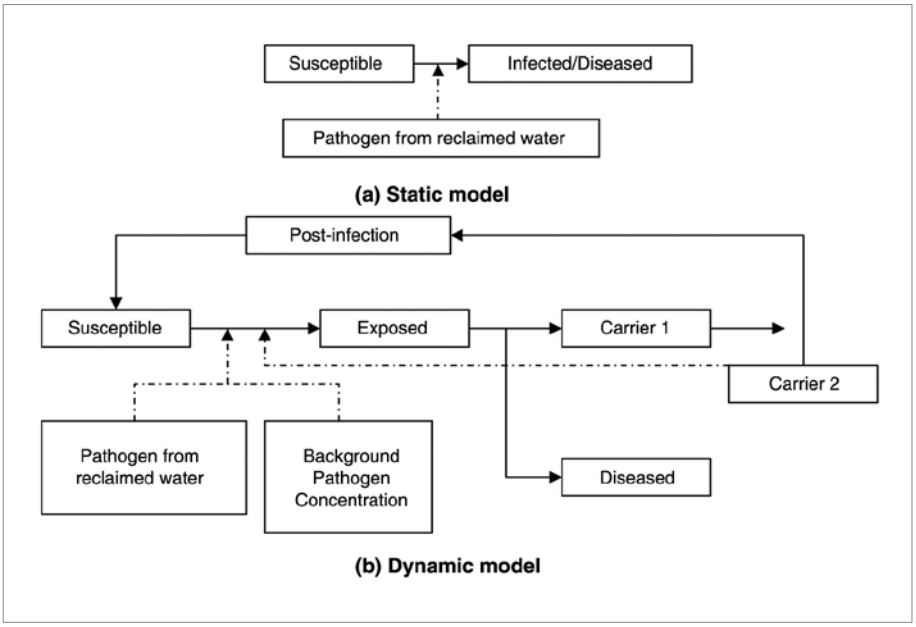

Figure 2: Comparison of the static and dynamic risk assessment model (Soller et al., 2004)

drinking water treatment process. Since the assessment of every pathogen is not a viable procedure, there is necessity for an easy, fast and economic faecal contamination indicator (Campos, 2008). A health risk assessment model is necessary to estimate the public health risk from exposure to pathogenic microorganisms originating from wastewater.

2.1 MICROBIAL INDICATOR

WHO (2006) has elucidated the term microbial indicators by selecting a group of organisms that demonstrate the efficiency of a process. The indicators, such as total heterotrophic bacteria or total coliforms, and faecal indicators, indexes and model organisms as a group or species thus indicating the presence and behaviour of certain pathogens, such as *E.coli* as an index for *Salmonella* and F-RNA coliphages as models of human enteric viruses.

However, evidence has suggested the bacterial indicator of water quality (*i.e.* total and faecal coliforms) is insufficient to demonstrate the adequate disinfection of effluent (Sobsey, 1989). It is necessary to define suitable indicators in order to establish the biological quality of different types of wastewater. Otherwise, an analysis using bacterial indicators detects only the quality of a single sample of wastewater, not the constant quality during a given time and is not sufficient to determine the microbial quality.

2.2 MONITORING AND SURVEILLANCE SYSTEM

Investment on the development of a molecular biological method to enable faster determination of specific microorganisms and which is more compatible for surveillance and monitoring is recommended. The code of practice for management and surveillance need to be established for a better prediction of microbial water quality. The level of contamination at the target area should be reported and monitored periodically. A comprehensive health risk assessment is indispensable for evaluating the human health effect due to the infection of target microorganisms.

Thus, useful tools are essential for the prevention and control of microbiological safety in water and wastewater. To determine the public health risk caused by human enteric viruses in water, a reliable, sensitive and practical method of virus detection is needed. The occurrence of viruses that replicate poorly or not in cell culture became a subject in developing DNA detection techniques known as Polymerase Chain Reaction (PCR). The invention of PCR has greatly enhanced the ability to detect human viruses in the environment including water, seawater, sewage and food (Katayama *et al.*, 2002; Greening and Hewitt, 2008). PCR is one of the most sensitive methods available for viral monitoring (Shieh *et al.*, 2008; Rodriguez *et al.*, 2009).

2.3 HEALTH RISK ASSESSMENT MODEL

To develop a health risk assessment model, existing static and dynamic models were found to be pervasive. The important difference employed for static and dynamic risk assessment models is shown in Figure 2 as described by Soller *et al.* (2004).

In this figure, the static model focuses on estimating the probability of infection or disease to an individual because of a single exposure event, whereas the dynamic model considers the transmission and the population is broken into a group of epidemiological states. The objective of evaluating the risk assessment models is to differentiate between the conditions under which the static and dynamic models predict similar and substantially different estimations of risk and thereby discover when it might be

appropriate to use the static model and when the dynamic model is necessary. However, the model evaluations were based of two conditions:

- If both the models predict similar estimations of the risk, the static model is more appropriate as it is simpler yet yields similar results.
- If two models predict substantially different estimations of risk, the dynamic model is more appropriate, as one or more infectious disease processes can affect the assessment enough to alter the assessment of risk.

The main parameters that influence the analysis sensitivity of the static and dynamic models for the health risk assessment are dose of pathogen, exposure intensity, dose-response parameter and duration of infection. The guideline should clearly indicate the tolerable level of pathogens that should be released depending on the treatment and final receiving area. Another important item to be considered is the health outcome associated with pathogenic microorganisms when the public is exposed to pathogens originating from wastewater. The trend from the monitoring and surveillance can be used to calibrate the model for future prediction. This is important because pathogens occurrence varies seasonally.

2.4 TREATMENT SELECTION

In order to achieve total management of pathogenic microorganisms, all types of wastewater should be collected and treated in a wastewater treatment plant. The quality of treated wastewater released to the environment depends on the receiving area. The treatment and quality recommended by USEPA, 2004 and WHO, 2006 is summarised in Table 2.

Recent technologies in wastewater treatment, including ultraviolet disinfection, ozonation and membrane filtration, have increasingly been studied and adopted as a tertiary treatment especially during the water reclamation process. Further study is needed to select an appropriate treatment to achieve the recommended guideline. Advance technology should be considered for the effective removal of pathogenic microorganisms in order to control waterborne-diseases originating from wastewater and to protect human health.

3.0 CONCLUSION

There were evidences showing that pathogenic microorganisms originating from wastewater caused severe effect to human health risk. This indicates that a high concentration of pathogenic microorganisms have been released to the environment from untreated or partially treated wastewater. One of the mechanisms to solve this problem is to consider water reuse. However, human health risk relating to pathogenic microorganisms originating from wastewater is a major concern. Unfortunately, in Malaysia, the wastewater effluent standard excluded microbial parameters from the regulation. A few recommendations are listed as follows:

- Develop a guideline related to microbial parameter in wastewater discharges. This is recommended to be considered in the Malaysian environment quality act as one of the mechanisms to control the overloading of pathogenic microorganisms in receiving water bodies.
- It is essential because the receiving water bodies are also water resources for many purposes including intake for drinking water and body contact recreational area. Untreated or

Table 2: Recommended type of reuse, treatment and quality for wastewater reuse modified from USEPA (2004) and WHO (2006) for the Malaysian standard

Type of reuse	Unrestricted urban area[1]	Restricted urban area[2]	Agricultural for food crops[3]	Agricultural for non- food crops[4]	Unrestricted Recreational[5]	Restricted recreational[6]	Industrial[7]	Indirect potable use[8]	Nature (i.e. wetland)
Treatment									
Secondary treatment, filtered and disinfection	★		★		★				
Secondary treatment and disinfection		★		★		★	★	★	
Microbial quality									
Bacterial indicator	☆	☆	☆	☆	☆	☆	☆	☆	
Virus indicator	☆		☆		☆				

Notes:

1) Unrestricted urban area – involves high degree of treatment where there are uncontrolled public exposure
2) Restricted urban area – when public exposure to the reclaimed water is controllable.
3) Agricultural for food crops – only if the crops is to be eaten raw or without being processed
4) Agricultural for non-food crops – involves a less stringent treatment, but still considers the exposure to workers
5) Unrestricted recreational – involves body contact recreation and uncontrolled public access area
6) Restricted recreational – involves non-body contact recreation and controlled area
7) Industrial reuse – based on the level of exposure to workers
8) Indirect potable use – involves surface water sources that are used or will be used for public water supplies or to recharge groundwater used as a domestic water supply

partially treated wastewater can create a hazardous effect to public health.

- Comprehensive health risk assessment and close monitoring is the key to preparing the guideline. More study is needed to select an appropriate treatment for the disinfection of pathogens.
- Based on local and environmental conditions, a suitable microbial indicator should be identified. ■

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ANNOUNCEMENT

IEM would like to inform all its members that the Registrar of Societies has approved the Institution's application for Graduate Engineers and Corporate Members of IEM who are not Professional Engineers registered under the registration of Engineers Act to use the abbreviation "Engr." before their name. For Corporate Members who are Professional Engineers, the abbreviation "Ir." is to be used.

NOTICE

TEMPLATE SERAGAM SENARAI SEMAK DOKUMEN DAN SENARAI SEMAK TERPERINCI AGENSI TEKNIKAL LUARAN

Dengan segala hormatnya merujuk kepada surat rujukan **KPKT(2)828/52 Klt. 10(13)** bertarikh **12 Mei 2009** mengenai perkara tersebut di atas.

2. Untuk makluman, Template Seragam Senarai Semak Dokumen dan Senarai Semak Terperinci Agensi Teknikal Luaran bagi permohonan baru yang dikemukakan melalui Pusat Setempat (OSC) telah dikuatkuasakan pemakaiannya mulai 1 Julai 2009. Melalui penggunaan contoh rangka tersebut, penyediaan dan pengemukakan dokumen pemohonan caadangan pemajuan serta perkara-perkara terperinci yang perlu disedia dan disemak pematuhannya adalah berdasarkan senarai semak yang sama. Walau bagaimanapun, hasil pemantauan Jabatan ini mendapati kesedaran serta tahap pemakaian contoh rangka tersebut adalah rendah.

3. Sehubungan dengan itu, bagi memastikan pemakaian contoh rangka yang lebih berkesan dan efisyen, jabatan ini memohon kerjasama pihak Y. Bhg. Datuk/Tuan/Puan untuk melakukan pautan (link) kepada contoh rangka tersebut dalam laman web masing-masing. Untuk makluman, contoh rangka tersebut boleh diperolehi dari http://jkt.kpkt.gov.my.

Sekian, terima kasih.